GEPHE SUMMARY

Gephebase Gene
Epithiospecifier protein (ESP) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Epithiospecifier protein (ESP)^#gephebase-summary-title)

GepheID
GP00000279

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait #1

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Plant secondary metabolite (glucosinolate) (https://www.gephebase.org/search-criteria?/and+Trait=^Plant secondary metabolite (glucosinolate)^#gephebase-summary-title)

Trait State in Taxon A
Arabidopsis thaliana- Ler0

Trait State in Taxon B
Arabidopsis thaliana- Ms-0

Trait #2

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Herbivore resistance (https://www.gephebase.org/search-criteria?/and+Trait=^Herbivore resistance^#gephebase-summary-title)

Trait State in Taxon A
-

Trait State in Taxon B
-

Ancestral State
Taxon A

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Arabidopsis thaliana- Ler0

Taxon B

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Arabidopsis thaliana- Ms-0

GENOTYPIC CHANGE

Generic Gene Name

ESP

Synonyms

epithiospecifier protein; EPITHIOSPECIFYING SENESCENCE REGULATOR; ESR; F15I1.12; F15I1_12; TASTY; At1g54040

String

3702.AT1G54040.2 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT1G54040.2)

Sequence Similarities

-

GO - Molecular Function

GO:0030234 : enzyme regulator activity (https://www.ebi.ac.uk/QuickGO/term/GO:0030234)

GO - Biological Process

GO:0042742 : defense response to bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0042742)
GO:0019762 : glucosinolate catabolic process (https://www.ebi.ac.uk/QuickGO/term/GO:0019762)
GO:0010150 : leaf senescence (https://www.ebi.ac.uk/QuickGO/term/GO:0010150)
GO:0080028 : nitrile biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0080028)
GO:0009753 : response to jasmonic acid (https://www.ebi.ac.uk/QuickGO/term/GO:0009753)

GO - Cellular Component

GO:0005829 : cytosol (https://www.ebi.ac.uk/QuickGO/term/GO:0005829)
GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)

UniProtKB Arabidopsis thaliana

Q8RY71 (http://www.uniprot.org/uniprot/Q8RY71)

GenebankID or UniProtKB

EU404390 (https://www.ncbi.nlm.nih.gov/nuccore/EU404390)

Presumptive Null

Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title)

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

Deletion (https://www.gephebase.org/search-criteria?/and+Aberration Type=^Deletion^#gephebase-summary-title)

Deletion Size

100-999 bp

Molecular Details of the Mutation

deletion of 124 bases that eliminates a splice site and 100 nucleotides of the ORF

Experimental Evidence

Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)

Main Reference

The Arabidopsis epithiospecifier protein promotes the hydrolysis of glucosinolates to nitriles and influences Trichoplusia ni herbivory. (2001) (https://pubmed.ncbi.nlm.nih.gov/11752388)

Authors

Lambrix V; Reichelt M; Mitchell-Olds T; Kliebenstein DJ; Gershenzon J

Abstract

Glucosinolates are anionic thioglucosides that have become one of the most frequently studied groups of defensive metabolites in plants. When tissue damage occurs, the thioglucoside linkage is hydrolyzed by enzymes known as myrosinases, resulting in the formation of a variety of products that are active against herbivores and pathogens. In an effort to learn more about the molecular genetic and biochemical regulation of glucosinolate hydrolysis product formation, we analyzed leaf samples of 122 Arabidopsis ecotypes. A distinct polymorphism was observed with all ecotypes producing primarily isothiocyanates or primarily nitriles. The ecotypes Columbia (Col) and Landsberg erecta (Ler) differed in their hydrolysis products; therefore, the Col x Ler recombinant inbred lines were used for mapping the genes controlling this polymorphism. The major quantitative trait locus (QTL) affecting nitrile versus isothiocyanate formation was found very close to a gene encoding a homolog of a Brassica napus epithiospecifier protein (ESP), which causes the formation of epithionitriles instead of isothiocyanates during glucosinolate hydrolysis in the seeds of certain Brassicaceae. The heterologously expressed Arabidopsis ESP was able to convert glucosinolates both to epithionitriles and to simple nitriles in the presence of myrosinase, and thus it was more versatile than previously described ESPs. The role of ESP in plant defense is uncertain, because the generalist herbivore Trichoplusia ni (the cabbage looper) was found to feed more readily on nitrile-producing than on isothiocyanate-producing Arabidopsis. However, isothiocyanates are frequently used as recognition cues by specialist herbivores, and so the formation of nitriles instead of isothiocyanates may allow Arabidopsis to be less apparent to specialists.

Additional References

RELATED GEPHE

Related Genes

3 (ACD6 = ACCELERATED CELL DEATH 6, CYP81F2, UDP-glycosyltransferase 89A2) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Plant secondary metabolite/or+Taxon ID=^3702^/and+Trait=Herbivore resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Epithiospecifier protein (ESP)^/and+Taxon ID=^3702^/or+Gene Gephebase=^Epithiospecifier protein (ESP)^/and+Taxon ID=^3702^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

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